

Claims

1. An arrangement comprising:
 - a first module that receives information from a plurality of routers of a network;
 - a second module that carries out analysis of said information relative to preselected thresholds;
 - a third module responsive to analysis results of said second module that, when said analysis results indicate an unsatisfactory operational condition in said network, develops configuration-information regarding configuration files of one or more of said routers; and
 - a fourth module that transmits said configuration-information to said one or more of said routers to modify a configuration file within said one or more of said routers that, in turn, modifies operation of said one or more of said routers.
2. The arrangement of claim 1 where said first module receives said information independently of any request for information by said first module.
3. The arrangement of claim 1 where said first module receives said information by polling said routers.
4. The arrangement of claim 1 where said first module polls said routers pursuant to an internal algorithmic process, or periodically.
5. The arrangement of claim 1 where said first module receives first type of information from said routers independently of any request for information, and receives second type of information from said routers in response to polling requests launched by said first module.
6. The arrangement of claim 5 where the first type of information includes exception that reports alert said first module of occurrence of predetermined events, and said second type of information comprises monitored values information of variables specified in said polling requests

7. The arrangement of claim 6 where said first type of information further includes information relating to packet flow through said routers.

8. The arrangement of claim 1 where said second module, in said analysis, distills performance information from said information received from said routers, and evaluates said performance information relative to said preselected thresholds.

9. The arrangement of claim 8 wherein said analysis determines whether said performance information exceeds one or more of said thresholds.

10. The arrangement of claim 8 wherein said analysis determines whether said performance information exceeds one or more of said thresholds by more than a predetermined number of times within a selected time interval.

11. The arrangement of claim 1 where the thresholds relate to one or more from a set including load carried by said routers, classes of applications, service level agreements, applications of specific customers, and quality-of-service parameters.

12. The arrangement of claim 1 where said analysis identifies routers whose mode of operation is in need of modifying.

13. The arrangement of claim 1 further comprises a memory that stores quality-of-service parameters, service level agreements parameters, and a configuration file for each of said routers that is controlled by a configuration file.

14. The arrangement of claim 1 where said thresholds are related to said quality-of-service parameters that are stored in said memory, and to said service level agreements parameters that are stored in said memory.

- 15.** The arrangement of claim 1 where said configuration file of one router comprises sub-configuration files.
- 16.** The arrangement of claim 15 where said configuration file of said one router comprises one or more sub-configuration files taken from a set that includes a sub-configuration file that directs operation of a controller of said one router, sub-configuration files that control one or more line cards of said one router, and sub-configuration files that control receiving elements of said one router.
- 17.** The arrangement of claim 1 where said configuration-information developed by said third module for one of said routers is a modified configuration file for said one of said routers.
- 18.** The arrangement of claim 1 where said configuration-information developed by said third module for one of said routers is a modification of said configuration file for said one of said routers.
- 19.** The arrangement of claim 18 where said modification modifies assignments of class to applications, modifies scheduling algorithm in line cards of said one or more routers, or modifies queue limits in line cards of said one or more routers.
- 20.** The arrangement of claim 18 where said modification comprises instructions to replace elements in said configuration file of said one of said routers, or to modify elements in said configuration file of said one of said routers.
- 21.** The arrangement of claim 20 where said elements of said configuration file are sub-configuration files.
- 22.** The arrangement of claim 20 where said elements of said configuration file are parameters of sub-configuration files of said configuration file.

23. The arrangement of claim 19 where said assignments of class to applications are reflected in assignment in TOS field of packets entering said one of said routers.

24. The arrangement of claim 1 where said configuration file includes a directive to install said configuration-information.

25. The arrangement of claim 24 where said directive causes installation of said configuration-information upon receipt of said configuration-information.

26. The arrangement of claim 1 where said fourth module also transmits a directive to install said configuration-information.

27. The arrangement of claim 1 where said configuration file of said one router includes one or more elements from a set comprising

scheduling algorithm for outputting packets from a line card of said one router,
queue sizes in a line card of said one router,

transmission buffer size in said line card of said one router,

processing algorithm and parameters of processing elements of input ports of said one router,

TOS specifications,

information that said routers are to send back to said fourth module on a continuous basis,

information that said one router is to store in a MIB file that is accessible to said fourth module through polling, and

analysis algorithms that said one router is to undertake.

28. The arrangement of said claim 1, further comprising a network comprised of said plurality of routers, with said routers being coupled to said fourth module.

29. The arrangement of claim **28** where some of said routers are access routers in said plurality of routers, and remaining ones of said routers in said plurality of routers are backbone routers.

30. The arrangement of claim **29** where said access routers include means for sending test packets through said network, resulting in end-to-end delay information being provided to said first module.

31. An method executed by a computer comprising the steps of:
a receiving information from a plurality of routers of a network;
analyzing said information relative to preselected thresholds;
when said step of analyzing indicates an unsatisfactory operational condition in said network, developing configuration-information regarding configuration files of one or more of said routers; and
transmitting said configuration-information to said one or more of said routers to modify a configuration file within each of said one or more of said routers that, in turn, modifies operation of said one or more of said routers.

32. The method of claim **31** where said receiving of information occurs without any explicit request for information.

33. The method of claim **31** further comprising a step of polling said routers, pursuant to a algorithm executed by said computer, in response to which information arrives at said computer and is received by said step of receiving.

34. The method of claim **31** where said step of receiving receives first type of information from said routers independently of any request for information, and receives second type of information from said routers in response to polling requests launched by said computer.

35. The method of claim 34 where the first type of information includes exception reports alerting said first module of occurrence of predetermined events, and said second type of information comprises monitored values information of variables specified in said polling requests

36. The method of claim 35 where said first type of information further includes information relating to packet flow through said routers.

37. The method of claim 7 where said step of analyzing distills performance information from said information received from said routers, and evaluates said performance information relative to said preselected thresholds.

38. The method of claim 8 said step of analyzing determines whether said performance information exceeds one or more of said thresholds more than a predetermined number of times within a selected time interval.

39. The method of claim 31 where the thresholds relate to one or more from a set including load carried by said routers, classes of applications, service level agreements, applications of specific customers, and quality-of-service parameters.

40. The method of claim 1 where step of analyzing identifies routers whose mode of operation is in need of modifying.

41. The method of claim 31 where said configuration-information developed by said step of developing is a modified configuration file one of said routers.

42. The method of claim 41 where said modified configuration file comprises one or more sub-configuration files taken from a set that includes a sub-configuration file that directs operation of a controller of said one router, sub-configuration files that control one or more lines cards of said one router, and sub-configuration files that control receiving elements of said one of said routers.

43. The method of claim 31 where said configuration-information developed by said step of developing is an update to a configuration file one of said routers.

44. The method of claim 43 where said modification modifies assignments of class to applications, modifies scheduling algorithm in line cards of said one of said routers, or queue limits in line cards of said one of said routers.

45. The method of claim 44 where said assignments of class to applications are reflected in assignment in TOS field of packets entering said one of said routers.

46. The method of claim 31 where said configuration file includes a directive to install said configuration-information.

47. The method of claim 31 where said configuration information is a configuration file that includes one or more elements from a set comprising scheduling algorithm for outputting packets from a line card of said one router, queue sizes in a line card of said one router, transmission buffer size in said line card of said one router, processing algorithm and parameters of processing elements of input ports of said one router, TOS specifications, information that said routers are to send back to said fourth module on a continuous basis, information that said one router is to store in a MIB file that is accessible to said computer through polling, and analysis algorithms that said one router is to undertake.